


Anaerobic Digestion – Resources

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Outline for Discussion

➤ Technical Resources

- Consultants
- Cornell Manure Management
- NRAES
- EPA AgStar
- NYSERDA

➤ Financial Resources

- Feasibility Studies/Business Planning
- Grant Opportunities
- Private Development

Technical Resources - Consultants

- Designers, vendors, nutrient planners,
- Technical and financial services (feasibility studies)
- List in proceedings, EPA AgStar and CU manure management website
- Consultant costs may be offset by grant programs

Technical Resources - Cornell Manure Management Program

- PRO-DAIRY, BEE, CWMI, AIC
- www.manuremanagement.cornell.edu
 - Central site for technology transfer (technology descriptions, project updates, case studies, news reports, articles feasibility studies, NY funding sources, related links)
 - Digestion, composting, nutrient management
 - Sponsored by NYSERDA

Technical Resources - NRAES

- National Resource, Agriculture & Engineering Service website:
www.nraes.org
- Conferences
- Manure Management Publications
 - Conference Proceedings
 - Anaerobic Digestion
 - Composting

Technical Resources - EPA AgStar

- Website: www.epa.gov/agstar
- Basic digester information
(technology descriptions, case studies, articles, list of operating digesters in US)
- Service/equipment providers
- Federal and state funding sources
- Farmware v2.0 pre feasibility software and handbook

AgStar Farmware v. 2.0 Model

➤ Pre-feasibility purposes

➤ Relatively easy to use

➤ Inputs:

- Farm details
- Cost rates

➤ Outputs:

- Capital costs
- Energy balance

Farmware - Sample Inputs

AgSTAR FarmWare: [C:\AGSTAR\TESTTOM1.AG2]

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Retrieves Save Print Climate FarmType Mgt Train Number Facilities Phenyl Other Benefits Energy Energy Report Summary CashFlow Rates Exit

Manure Management Train Control Panel

Livestock Control Panel

Units	Number	Weight	Manure	VS	Manure	VS
	Head	lbs	lbs/day/AU	lbs/day/AU	lbs/day	lbs/day
Cow-Lac	1,000	1,400.0	80.0	8.5	112,000	11,900
Cow-Dry	200	1,300.0	82.0	8.1	21,320	2,106
Heifer	200	900.0	85.0	7.8	15,300	1,404
Calf						
Bull						
None						
None						
Total						

AU=100
To char

FarmWare: Energy Usage and Payments

CURRENT ELECTRICITY USAGE AND PAYMENTS

How much electricity do you use per year (kWh) ? or

What price do you pay per kWh of electricity (\$) ? or

Your annual electricity bill should then equal:

Relative to the general annual inflation rate, how do you expect annual electricity prices to change over the lifetime of the project?

CURRENT PROPANE USAGE AND PAYMENTS

How much propane (or equivalent) do you use per year (gallons) ?

What price do you pay per gallon of propane (\$) ?

Your annual propane bill should then equal:

Relative to the general annual inflation rate, how do you expect annual propane prices to change over the lifetime of the project?

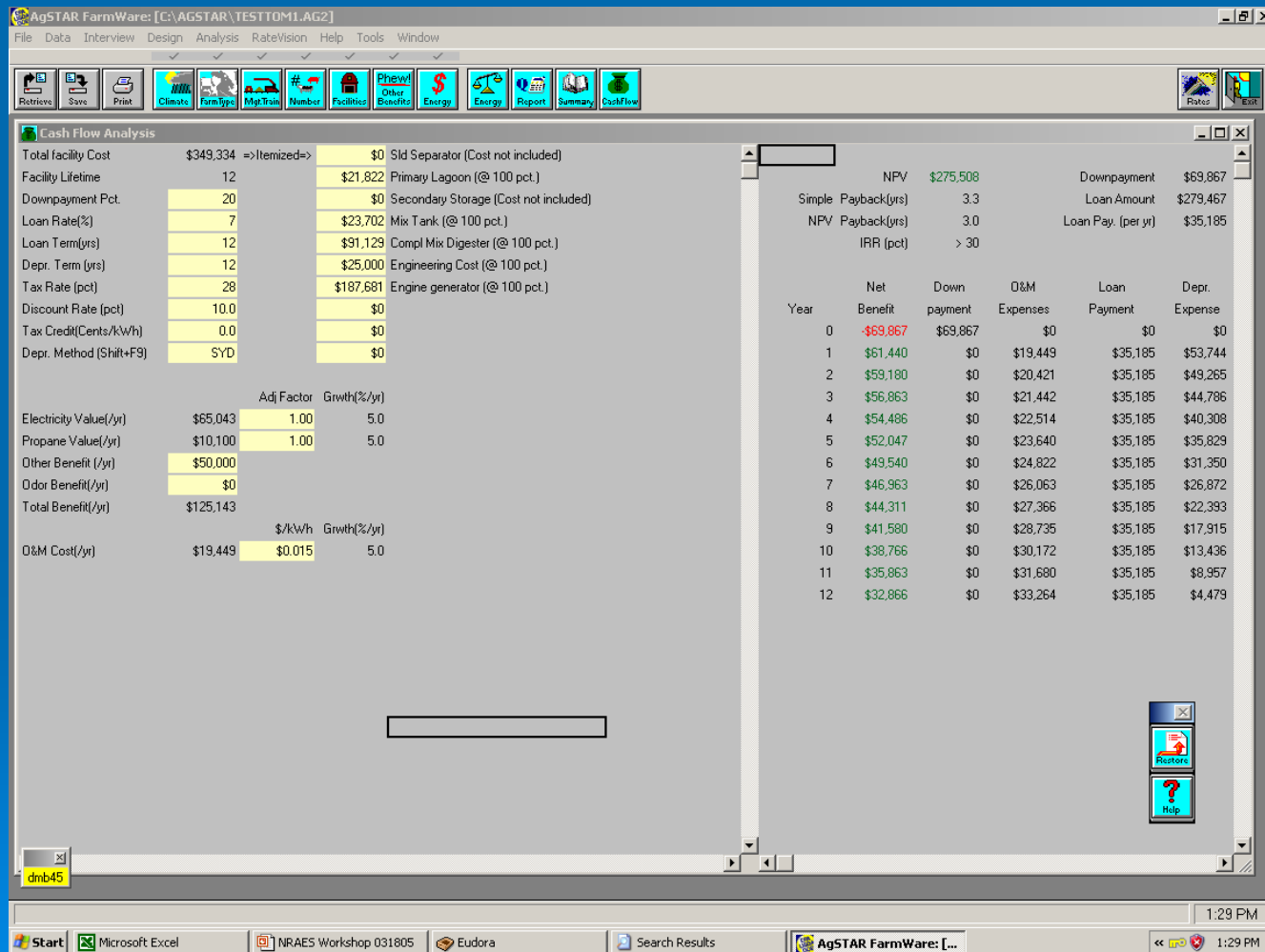
What is the maximum fraction of your propane expenses that can be offset by waste heat from your energy recovery system (0 - 100%)?

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Start Microsoft Excel NRAES Workshop 031805 Eudora Search Results AgSTAR FarmWare: [...

Farmware – Sample Outputs



Technical/Financial Resources - NYSERDA

- NY State Energy Research & Development Authority website:
www.nyserda.org
- Digester Technology Transfer
- Funding of new technology development and project implementation through various grant and loan programs

Financial Resources - Feasibility Studies/Business Plans

- A “Must” for digester projects - capital
- Define environmental and economic goals (odor control, liability reduction, jobs, operating cost reduction, diversification)
- Develop details (e.g. design options, transportation, solids, power connection, tax credits, zoning/regulatory issues),
- Project financials (capital required, income statements, cash flow all needed for financing and grant applications)

Financial/Technical Resources NY Ag Innovation Center (AIC)

- www.bee.cornell.edu/extension/manure
- Business planning assistance for digester implementation
- Pro-forma financials spreadsheet for lending/grant application purposes
 - Demonstration

Inputs – ProForma Spreadsheet

Microsoft Excel

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Pro-Forma Financials v2 012805

A	B	C	D	E	F	G	H	I	J	K	L	M
5	Capital Costs											
6												
7	Item Description	Cost	Digester System	Power Gen System	Solids Separation	Composting Solids Handling	Liquids Handling	Allocation Total	Depreciation Life (years)	Salvage Value %	Salvage Value \$	
8	Building	\$100,000	70%	30%	0%	0%	0%	100%	20	10%	\$10,000	
9	Site Work	\$50,000	60%	30%	10%	0%	0%	100%	20	0%	\$0	
10	Power Wiring	\$150,000	5%	85%	10%	0%	0%	100%	20	7%	\$10,500	
11	Manure Piping	\$25,000	60%	0%	40%	0%	0%	100%	20	7%	\$1,750	
12	Generator	\$150,000	0%	100%	0%	0%	0%	100%	7	10%	\$15,000	
13	Boiler	\$25,000	90%	10%	0%	0%	0%	100%	15	10%	\$2,500	
14	Solids Separation	\$40,000	0%	0%	100%	0%	0%	100%	7	10%	\$4,000	
15	Digester Tank	\$200,000	100%	0%	0%	0%	0%	100%	20	10%	\$20,000	
16	Pumps	\$20,000	100%	0%	0%	0%	0%	100%	7	8%	\$1,600	
17	Controls	\$15,000	5%	90%	5%	0%	0%	100%	15	5%	\$750	
18	Project Development	\$50,000	50%	35%	15%	0%	0%	100%	20	0%	\$0	
19	Engineering	\$75,000	45%	45%	10%	0%	0%	100%	20	0%	\$0	
20	Consulting	\$20,000	45%	45%	10%	0%	0%	100%	20	0%	\$0	
21	Construction/management	\$120,000	50%	40%	10%	0%	0%	100%	20	0%	\$0	
22			0%	0%	0%	0%	0%	0%	20	0%	\$0	
23			0%	0%	0%	0%	0%	0%	20	0%	\$0	
24												
25												
26												
27	Totals	\$1,040,000										
28	Total/cow	\$1,040										
29												
30												
31												
32	System	Capital Cost	System Construction (Engineering/Purchase) Start Date (Month #)	System Completion (Start-up) Date (Month #)								
33	Digester	\$493,500	2	9								
34	Power Generation	\$446,750	2	9								
35	Solids Separation/Handling	\$99,750	3	9								
36	Composting	\$0	4	9								
37	Liquids Treatment/Handling	\$0	6	9								
38	Totals	\$1,040,000										

Capital Inputs Financing Inputs Digest Input CoGen Input Solids Input Compost Input Liquid

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Digester – Income Statement

Microsoft Excel

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Summary Cash Flow

Microsoft Excel

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Pro-Forma Financials v2 012805

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	ProForma Cash Flow Combined System			Year 1												Totals
2				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year 1
3	CASH FLOWS FROM OPERATIONS															
4	Digestion	-	31,250	30,208	30,211	30,214	30,218	30,221	30,224	29,235	(2,024)	(2,009)	6,565			244,313
5	Co-Generation	-	18,750	17,192	17,198	17,204	17,211	17,217	17,224	20,317	1,890	2,340	2,938			149,482
6	Solids Separation/Handling	-	3,750	3,458	3,459	3,460	3,461	3,462	3,463	7,158	3,404	3,406	4,321			42,802
7	Composting	-	-	-	-	-	-	-	-	-	-	-	-			-
8	Liquids Handling	-	-	-	-	-	-	-	-	-	(167)	(153)	(93)	(94)		(507)
9	Net Cash from Operations	-	53,750	50,858	50,869	50,879	50,889	50,900	50,910	56,543	3,118	3,645	13,730			436,090
10	CASH FLOWS FROM INVESTING															
11	Digestion	-	(246,750)	(41,125)	(41,125)	(41,125)	(41,125)	(41,125)	(41,125)	(41,125)	-	-	-	-		(493,500)
12	Co-Generation	-	(223,375)	(37,229)	(37,229)	(37,229)	(37,229)	(37,229)	(37,229)	(37,229)	-	-	-	-		(446,750)
13	Solids Separation	-	-	(49,875)	(9,975)	(9,975)	(9,975)	(9,975)	(9,975)	(9,975)	-	-	-	-		(99,750)
14	Composting	-	-	-	-	-	-	-	-	-	-	-	-	-		-
15	Liquids Handling	-	-	-	-	-	-	-	-	-	-	-	-	-		-
16	Net Cash from Investing	-	(470,125)	(128,229)	(88,329)	(88,329)	(88,329)	(88,329)	(88,329)	(88,329)	-	-	-	-		(1,040,000)
17	CASH FLOWS FROM FINANCING															
18	Digestion	-	200,000	(571)	(574)	(577)	(580)	(583)	(586)	(590)	(593)	(596)	(599)			194,150
19	Co-Generation	-	280,000	(1,072)	(1,079)	(1,085)	(1,091)	(1,098)	(1,104)	(1,111)	(1,117)	(1,124)	(1,131)			268,988
20	Solids Separation	-	55,000	(159)	(160)	(160)	(161)	(162)	(163)	(164)	(165)	(166)	(167)			53,373
21	Composting	-	-	-	-	-	-	-	-	-	-	-	-			-
22	Liquids Handling	-	-	-	-	-	-	-	-	-	-	-	-			-
23	Value Added Venture	-	-	-	-	-	-	-	-	-	-	-	-			-
24	Net Cash from Financing	-	535,000	(1,802)	(1,812)	(1,823)	(1,833)	(1,843)	(1,854)	(1,864)	(1,875)	(1,886)	(1,896)			516,511
25	NET CHANGE IN CASH	-	118,625	(79,173)	(39,273)	(39,273)	(39,273)	(39,273)	(39,273)	54,679	1,243	1,759	11,833			(87,398)
26	OPENING CASH BALANCE	-	-	118,625	39,452	179	(39,094)	(78,367)	(117,640)	(156,913)	(102,234)	(100,991)	(99,232)			-
27	CASH BALANCE AT END OF PERIOD	-	118,625	39,452	179	(39,094)	(78,367)	(117,640)	(156,913)	(102,234)	(100,991)	(99,232)	(87,398)			(87,398)

SG&A Inputs Summary Financials O&M Summary Combined P&L Combined Cash Combined Balan

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3-Year Summary Financials

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Pro-Forma Financials v2 012805

	A	B	C	D	E	F	G	H	I	J	K	L
1		1,000	cows									
2												
3	Proforma Income Statement	Year 1	Year 2	Year 3								
4	Revenue	478,705	227,788	227,788								
5	Cost of Goods	11,145	31,105	31,105								
6	Gross Profit	467,559	196,683	196,683								
7	SG&A	3,973	10,100	10,100								
8	EBITDA	463,586	186,583	186,583								
9	Interest (Bldg & Equip)	28,449	32,708	31,040								
10	Depreciation (Bldg & Equip)	22,298	66,895	66,895								
11	Net Income	412,839	86,980	88,648								
12												
13	Profit (Cost) per cow	413	87	89								
14												
15												
16	Proforma Cash Flow	Year 1	Year 2	Year 3								
17	Cash flow from Operations	436,090	154,915	156,583								
18	Cash flows from Investing	(1,040,000)	0	0								
19	Cash flows from Financing	516,511	(23,617)	(25,285)								
20	Net Change in Cash	(87,398)	131,297	131,297								
21	Cash at Beginning of Period	0	(87,398)	43,899								
22	Cash at End of Period	(87,398)	43,899	175,197								
23												
24												
25	Proforma Balance Sheet	Year 1	Year 2	Year 3								
26	Current Assets	(87,398)	43,899	175,197								
27	Fixed Assets	1,017,702	950,807	883,913								
28	Total Assets	930,303	994,706	1,059,109								
29	Total Liabilities	516,511	492,894	467,609								
30	Total Equity	413,792	501,812	591,500								
31	Total Liabilities & Equity	930,303	994,706	1,059,109								
32												
33												
34												

Solids Input / Compost Input / Liquids Input / SG&A Inputs / **Summary Financials** / O&M Summary / Com

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Financial Resources - Grant Funding for Digestion

- Federal and NY State resource lists
 - EPA AgStar Website
 - Cornell manure management website (prepared by NY Ag & Markets)
- Changing program funding goals
- Careful consideration of program requirements (fund use, matching funds, construction standards, application, reporting)

Federal Grant Programs

- USDA Value Added Producer Grant program (USDA-RBCS, due May 2005)
- Environmental Quality Incentives Program (NRCS program – 2002 Farm Bill, producer oriented, 2006 FY?)
- Renewable Energy Systems/Energy Efficiency program (USDA-RBCS, 2002 Farm Bill)
- Other programs (AgStar, regional biomass energy, SARE)

NYSERDA Grant Programs

- Visit website for current programs & details
- FlexTech (Cost-share for technical assistance services to answer customer-specific energy questions)
- PON 858 (CHP feasibility studies) 5/31/05
- PON 914 (DG, CHP demonstration, feasibility, technology transfer, product development) 4/21/05
- Innovation in Agriculture & Others

NY State Grant Programs

- Farmland Viability Program (NY Ag & Markets)
- Food and Agriculture Industry Development Program (NY Ag & Markets)
- Ag NonPoint Source Abatement & Control Program (NYS Soil and Water Conservation Districts)
- Environmental Investment Program (Empire State Development)

Financial Resources - Loan Programs

- USDA Rural Development - Business & Industry Loan Guarantee Program
- NYSERDA
- Local IDA

Financial Resources - Private Party Development

- Developing interest in NY State
- Different goals, contract and operating terms
- Potential Advantages
 - Environmental benefits of digestion
 - Farmer does not have to invest
 - Developer responsible for management
 - Fixed energy/heat/bedding costs